DOCUMENT RESUME

ED 286 932 TM 870 574

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TITLE Computer as a Tool in SAT Preparation.
PUB DATE Feb 87
NOTE 16p.; Speech presented at the Annual Florida Instructional Computing Conference sponsored by the Florida Department of Education and the Florida Association of Educational Data Systems (7th, Orlando, FL, February 3, 1987).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Aptitude Tests; College Entrance Examinations; *Computer Assisted Instruction; Computer Software; Disadvantaged Youth; High Schools; *Instructional Effectiveness; *Low Achievement; Racial Factors; *Test Coaching; *Test Wiseness; Urban Education
IDENTIFIERS College Explorer Program; *Hayden SAT Preparation Program; Preliminary Scholastic Aptitude Test; *Scholastic Aptitude Test; TestSense Program

ABSTRACT

Two experimental programs, designed to increase Scholastic Aptitude Test (SAT) scores of inner city, low achieving students by using computer-assisted SAT preparation, produced differing results. Forty volunteers from a nearby high school were assigned to two groups of 20 each--one experimental and one control group. The first program provided six weeks of after-school work on the Hayden computerized SAT preparation program to 20 inner city high school seniors. They pretested on the SAT in November, 1985 and posttested in January, 1986. During the instructional program, supervisors recognized the subjects' frustration with the difficulty of the vocabulary and their repeated wrong answers on the computer tests, as well as their lack of motivation to attend the program. Results for the experimental groups showed that pretest to posttest mean scores dropped 22 points on verbal and rose 20 points on mathematics. The second program provided a two and one-half-week program, eliminated conflicts by scheduling during school hours, and added training on the TestSense computerized program, which teaches test-taking skills and strategies. These students' pre- and posttested on the PSAT, showing mean post-program gains of 51 points in verbal and 40 points in math. Results of the second study are encouraging for use of computers in training inner city students in test-wiseness and SAT content. (JGL)

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6-16-87

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COMPUTER as a TOOL in SAT PREPARATION

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at the seventh annual

FLORIDA INSTRUCTIONAL COMPUTING CONFERENCE

sponsored by the

FLORIDA DEPARTMENT of EDUCATION

and the

FLORIDA ASSOCIATION OF EDUCATIONAL DATA SYSTEMS

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February 3, 1987

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CAN COMPUTERS IMPROVE SAT SCORES?

by Gregory C. Coffin

"America's schools must turn their attention to the problems of the nation's underclass or risk the creation of an 'educational third world' in our nation's cities," Ernest L. Boyer, president of the Carnegie Foundation for the Advancement of Teaching, said in a recent speech before the National Press Club. "The most urgent issue we confront is this: Will America continue to believe in education for all children, or will it sort out schooling between winners and losers?"

The truth of these statements is driven home by SAT scores of 220, 230, 240, 250, and 290 attained on the November 1985 tests by seniors in an inner-city high school. The average citywide verbal score that year was 354, the math score 408; statewide averages were 436 and 473 respectively. Nationally, students averaged 431 in verbal and 475 in mathematics for a combined total of 906. Many of the inner-city students, some of whom have since entered college, did not come within 200 points of the national mean combined score. Some of them will succeed in college; others will drop out. But it is unlikely that any of the ones who scored under 600 will ever graduate. They are members of Boyer's "educational third world."

Increasing evidence shows that intensive preparation for the SAT's has a positive impact on test scores. New computer-based programs for SAT preparation are coming on the market every month. Private counseling, coaching, and tutoring centers are springing up everywhere. Clients for these services come predominantly from middle class white suburbs. Meanwhile the educational gap between the suburban middle class and the urban poor is widening.

In an attempt to counter this inequity the Urban Schools Collaborative at Northeastern University in Boston developed a simple model for test preparation using existent underutilized computer facilities. The project's goal was to demonstrate that, given access to appropriate computer hardware and software, inner-city students could score significantly higher on SAT's. Validation of this hypothesis would provide strong ammunition for extending access to school computers beyond regular school hours. At present, although all Boston's high schools have computer labs, they are locked up at the end of the school day. Very few inner-city students, in sharp contrast to their counterparts in the suburbs, have access to computers outside of school.

The research design for our project was simple. We found 40 volunteers in a nearby high school and assigned 20 to an experimental group and 20 to a control group. Although not all variables could be controlled, an attempt was made to equate the groups. An incentive for the students was that the registration fee on two sessions of the SAT would be waived. The experimental group was given eighteen hours of work on the Hayden SAT prep program, the control group none. Both groups, however, had an opportunity to use the "College Explorer" program and were given assistance in completing college applications and financial aid forms.

All the students took the SAT's on November 2, 1985. These scores served as the pre-test. Subsequently the experimental group completed eighteen hours of self-directed work on the SAT prep program, visiting our Apple IIe computer lab two afternoons a week for twelve one-and-a-half-hour sessions. All the students took the tests again on January 25, 1986, and pre- and post-test scores were compared. Although we had expected that gains in the experimental group would be significantly greater than gains in the control group, we were in for some surprises.

Before discussing the scores in the first phase of what became a two stage experiment, let me describe an incident that caused us to rethink the entire project. During one of the student lab sessions the project supervisor came into my office and said, "Greg, you really should go into the lab and spend some time with the students. You'll get a more realistic view of what to expect for results." Not sure what she meant, I went into the lab and sat down with two students who were working on antonyms at one of the computers. Without saying anything, I watched them guess their way through two questions, obviously becoming more frustrated and embarrassed as they went along. So I began to question them. Pointing to one of the screen's four possible responses, I asked, "What does this mean?" No answer, only a shaking of heads. I repeated the question with a couple more words and then another screen. Same response. It was obvious that the vocabulary of both question and responses was beyond the students' comprehension. We had assumed that the immediate feedback provided by the computer program would serve as positive behavior modification for the students; that, advised of correct answers, they would be encouraged to proceed; that they would not be upset by wrong answers since the dialogue was strictly between the student and the computer. We had not anticipated an extended series of wrong answers. The computer was saying exactly what some insensitive teachers had said to these students for years: "You're wrong! You're wrong! You're wrong!" And by implication, "You're dumb, dumb, dumb!" No wonder the comparative SAT scores were all over the lot! (See Table 1.) People can't score well on a test they can't understand.

Nor was poor reading ability the only factor affecting the outcome of the experiment. Although the study was supposed to have been conducted with 20 students in each of two groups, only 8 students in the control group

repeated the January SAT. The reward structure built into the program was insufficient to deter dropouts. Students in the experimental group would get 18 hours of SAT preparation on the computer; control-group students would not. Hence, after taking the November test and going through the College Explorer, there was no longer an incentive for control-group students to remain in the program, and only eight did so. Students also dropped out of the experimental group.

The lab is a brisk fifteen-minute walk from the high school; it can also be reached by subway. Students usually walked, frequently arriving late. During inclement weather attendance dropped off dramatically. Participating students were dismissed from school one period early to attend SAT sessions. Those taking drama had a conflict and were often late for or absent from their lab sessions.

The moment a program leaves the school grounds, much control is forfeited. Although the project director and lab supervisor provided a consistent positive atmosphere throughout the program, neither one had any authority over the students. Their only recourse was to report absences to the students' guidance counselor, and this did not provide enough leverage to improve attendance.

Students began the SAT prep program on the Monday following their first experience with the SAT. They were dismayed and overwhelmed by the length of the exam, the reading difficulty, and their perception that they had not performed well. They felt helpless and, although they realized that their participation in the SAT program could only help, they felt defeated from the start. Their scores on this pre-test validated their sense of defeat: mean verbal 292; mean math 287. (See Table 3.)

A few facts about the population of the school and the participant group

are useful. Of the total school enrollment of 483, 65 percent were female and 35 percent male. Twenty-five percent were white and 75 percent non-white -- Black, Asian, Hispanic, or other. Of 100 seniors, 65 would go on to some form of higher education. Of the original 40 students in the study, 29 (72.5%) were female and 11 (27.5%) male; 7 (17.5%) were white, and 33 (82.5%) non-white. Thus the composition of the original study group closely paralleled the population of the school. Moreover, the profile of the two groups whose scores are reported in Table 1 are representative of both the total school and the original study group.

Some conditions necessary for a legitimate test of the null hypothesis were present; others were not. Few variables could be effectively controlled.

Any future studies focused on this subject would have to provide motivation for good attendance throughout the duration of the study, including taking the second SAT.

Notwithstanding the problems encountered in our first attempt to gather useful data on computer assisted SAT preparation, the principal investigators undertook a second project. Although its research design was quite different, the null hypothesis was the same: that the structured, timely use of computerized SAT preparation programs will increase students' scores.

This time there was no control group, only an experimental group of 13 students (10 juniors and 3 seniors). Its profile was similar to that of the first group: 7 female and 6 male; 23 percent white, 38 percent black, 23 percent Hispanic, and 15 percent Asian.

Instead of stretching the program out over six weeks, students worked in the lab approximately two hours a day for two and one-half weeks. They were participating in a scheduling arrangement called a "minimester" in which

they worked on a project of their choice for three weeks. Thus we eliminated two of the major drawbacks in the first experiment: lack of rewards for the control group, and schedule conflicts inherent in after-school activities.

A new element enhanced motivation considerably. In spring 1986, after the first project had been completed, we learned about a software program entitled TestSense. Published and distributed by the College Entrance Examination Board, TestSense is an integrated program of software and printed materials. Designed to help students do their best on their PSAT/NMSQT (Preliminary Scholastic Aptitude Test/National Merit Scholarship Qualifying Test), it is equally valuable as preparation for taking the SAT. TestSense familiarizes students with the PSAT/NMSQT and helps them assess and improve their test-taking techniques. Although not designed specifically for SAT preparation, it became an invaluable piece of our program.

At the group's first meeting all students took the actual October 1982 paper and pencil PSAT under simulated testing conditions. They then entered their answers onto the student data disk. The TestSense program provides a thorough analysis of their responses on the sample test. Utilizing effective charts and graphs where desirable, it answers the following questions:

1. What are my scores?
2. How did I do on each question?
3. How did I do on the different kinds of questions?
4. How difficult was each question?
5. How can I do my best?
    a. Were there more questions I could have gotten right?
    b. Did I omit any questions I could have answered?
    c. Should I concentrate on any one kind of question?

6. What scores can I expect on the SAT?

7. How was my test scored?

In addition to this detailed analysis of each student's test responses, the "Test Minder" booklet, which is used in conjunction with the disk, shows students how to pace themselves, avoid problems associated with using the separate answer sheet, and gain points through educated guessing. Useful tips for tackling each kind of question presented on the SAT are set forth clearly and concisely. By the time students have completed the TestSense program and begin work on the SAT prep materials they have greatly increased confidence in what they are doing and what to expect, both in preparation and in taking their final SAT for college admission and scholarships. These aids will not compensate for an inadequate education, but they will enable a student to show all that he or she can do.

After completing the minimester the students were given a 1985 PSAT. Seven juniors and 3 seniors completed both the pre- and post-tests. The results were encouraging. All students showed some gains, seniors more than juniors. The mean verbal score for the total group climbed from 363 to 414, an increase of 51 points, and the mean math score increased from 345 to 385, a 40 point gain. (See Table 2.) Because of the small n (10), we do not consider these results statistically significant. However, a number of observations about the second project are worth noting.

Somewhat to our surprise, scoring the PSAT's became a group activity. Students would gather around the scorer and give moral support. Using the computer relieved some of the anxiety that students develop as they prepare for the SAT's. One said: "I like using the Hayden software because it was easy to understand. When you use the disk, it shows the correct answer. It also shows you how to do the problem. If it is English [vocabulary], it

tells you what the words mean. Then you understand why you got it wrong." According to another, the minimester program "is a tremendous advantage: finding out exactly where your weak points lie and actually having the chance to improve on specific types of problems."

A native of Zimbabwe, probably the group's most sophisticated student, said: "I found this SAT preparation course to be very enriching in that it permitted me to review the SAT's structure. From this I was able to discover my weak points and work on them." Further observations reflected his European schooling. "The manner in which this program was structured was effective. But I believe it could have been more effective in that the participants in the program shouldn't have been permitted as much freedom in the process of deciding what they were going to review. For, as you know, most of the students in this program are used to a structured curriculum. When they were placed in an environment which forced them to decide what, when, why, how and where they could study, they were incapable of budgeting or using their time constructively. That's why after ten days in this program certain students were beginning to rebel. They wanted freedom of choice in what they would study, but they also wanted to be monitored at the same time." In his evaluation this student suggested a number of ways in which the program could be improved. One was totally unexpected: "Even though this SAT prep approach is unique in using computers, you should realize that quite a few students aren't very computer literate. For that matter, some people are computer phobic and aren't comfortable using computers. And there's only so much info a computer program can provide. Students also require an adult human perspective."

Although we were keenly aware of the importance of the teacher's role in the project, we had assumed that all high school juniors and seniors felt

comfortable with computers, since in this city school system computer literacy is a requirement for graduation.

From the many excellent SAT prep software packages on the market, we chose the Hayden because it is relatively inexpensive, offers both testing and tutoring modes, is error-free, and presents questions, responses, and tutorials in clear prose and uncluttered format. Delay between questions is minimal. Student recordkeeping, although not extensive, is adequate. Supplementary skill-building programs in vocabulary, reading comprehension, and mathematics (geometry and algebra) are available.

A graduate assistant working in the program had this to say about the Hayden software. "It was challenging to run through the exercises, especially in the tutor mode, which explained each problem in detail. Exercises without tutor mode in math, algebra, and quantitative comparisions were frustrating for students at times, when they went wrong. And if too many such instances occurred, they [the students], would not bother to ask for help but would simply run aimlessly through the balance of the software program." He concluded his feedback: "On the whole, students coming out of this three week rigorous exercise feel more confident and prepared to take the SAT exam."

Henry Becker, a prominent guru in educational computing, has made a number of valuable observations. Schools need to analyze objectively what they are doing with computers. Too many schools are trying to do too many things, with the result that nothing really significant occurs. We must verify the effectiveness of computers in promoting learning. Parents and taxpayers as well as educators want to know if computers are making a difference. We believe our SAT project meets Becker's criteria.

Many people -- and I'm one of them -- are critical of the tremendous

increase in the use of standardized tests in schools today. Their results are being used to evaluate teachers, schools, and school systems, as well as students, even though we realize that tests are often a better indication of the socio-economic status of a student's parents than of the student's ability to do college work. By teaching test-wiseness to those low on the socioeconomic ladder we attack the equity issue.

According to an article by JoAnn and Paul Prell, "Improving Test Scores--Teaching Test-Wiseness," which appeared in the November 1986 Research Bulletin published by Phi Delta Kappa, although test-wiseness can be taught effectively to students of all ages, very few projects have taken test-wiseness and race or socioeconomic level into consideration. To those who view teaching test-wiseness negatively, the article says: "Training represents an attempt to ensure that all students possess a relatively equal level of the test-wiseness trait, so that the presence of test-wiseness cues on a test will not differentially reward high test-wise students while at the same time penalizing individuals low in test-wiseness. It is also thought that the elimination or reduction in differences in test-taking skills will provide truer estimates of the knowledge and abilities being assessed . . . Thus, as test-wiseness techniques are taught to students, a more accurate reflection or estimation of students' actual knowledge will increase and be improved."

The scores of the students who participated in our second project reflect a level of test-wiseness that is not reflected in the erratic scores of the students in our first group.

When this study was conceptualized in 1985, it appeared to be simple, uncomplicated. Our experience with the two projects undertaken to date has proved otherwise. Myriad uncontrollable variables, lack of authority over

the students, new software, and, most of all, an unwillingness deliberately to deny students access to **anything** that might improve their scores make it difficult to produce meaningful data. We can state only that exposure to TestSense, the Hayden SAT prep program, and some limited use of Baron's College Guide materials will add points to a student's PSAT scores. Although the results of the January 24, 1987, SATs are not yet available, we anticipate some improvement in them as well. Isolating a single causative factor is not possible. Both computer and human support make a difference. We intend to continue to offer SAT preparation programs to Boston's inner-city students. We plan to refine our model and offer workshops for interested teachers and guidance counselors in the hope that computer labs throughout the city will be made available to students for programs similar to the one described in this article. We will continue to accumulate data, imperfect though it may be, in our attempt to promote equity and increase the number of "winners" in the inner-city schools.

TABLE 1

EXPERIMENTAL GROUP

NAME	RACE	DRP 1985	NOV M/V	JAN M/V
	Black	67	220/250	260/280
	Black	84	270/440	290/450
	Asian	64	240/220	280/200
	Black	86	320/400	280/400
	White	75	270/320	340/220
	Asian	67	290/300	290/200
	Hispanic	75	260/310	240/320
	Hispanic	73	290/290	340/280
CONTROL GROUP				
	Black	73	280/230	270/230
	White	75	290/290	320/280
	White	34	240/250	300/240
	Black	85	370/370	350/240
	Black	85	350/370	330/290
	Hispanic	75	250/230	290/250
	Asian	55	290/200	450/270
	Asian	55	360/200	430/200

TABLE 2

RESULTS for JANUARY 1987 GROUP *

Pre-test (October 1982 PSAT)	Post-test (Sample 1985 PSAT)	Point Gain
	Juniors (7)	
verbal 346	369	23
math 350	390	40
	Seniors (3)	
verbal 380	460	80
math 340	380	40
	Total (10)	
verbal 363	414	51
math 345	385	40

* These are PSAT scaled scores converted to SAT format.

TABLE 3

RESULTS for JANUARY 1986 GROUP

Pre-test (November 1985 SAT)		Post-test (January 1986 SAT)	Point Gain/Loss
		Experimental Group (8)	
verbal	316	294	-22
math	270	290	20
		Control Group (8)	
verbal	268	271	3
math	360	343	-17
		Total (16)	
verbal	292	272	-20
math	287	316	29